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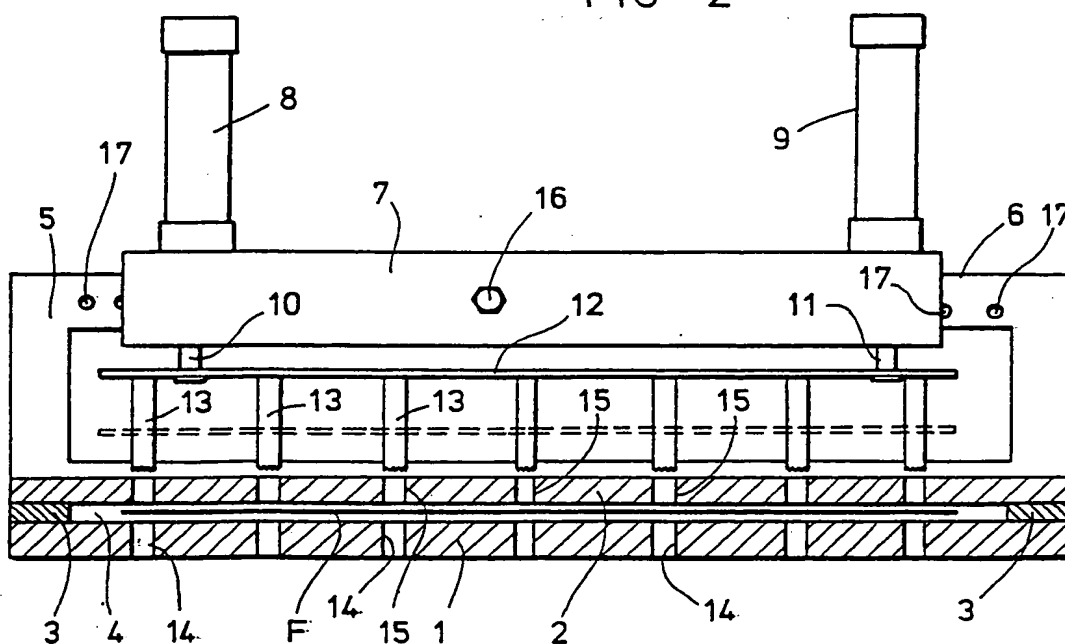
(56) Documents cited  
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(58) Field of search  
B4B  
B3W

## (54) Machine for perforating plastics film

(57) A machine for perforating a plastics film, comprises a die plate (1) and a stripper plate (2) arranged parallel to each other and spaced apart by a gap (4) in which the film (F) to be perforated is located, a punch carrier plate (12) arranged parallel to the stripper plate (2) on the side thereof opposite the die plate (1) a two-dimensional array of punch elements (13) attached to the carrier plate (12) and projecting towards the stripper plate (2) and fluid pressure actuator means (8, 9) connected to the carrier plate to move the latter perpendicular to its plane, the stripper plate (2) and the die plate (1) having respective apertures (15, 14) through which the punch elements pass in operation of the machine to punch a number of perforations simultaneously in a web of plastics film (F) located in the said gap, in a pattern predetermined by the array of punch elements.

FIG 2



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FIG 1

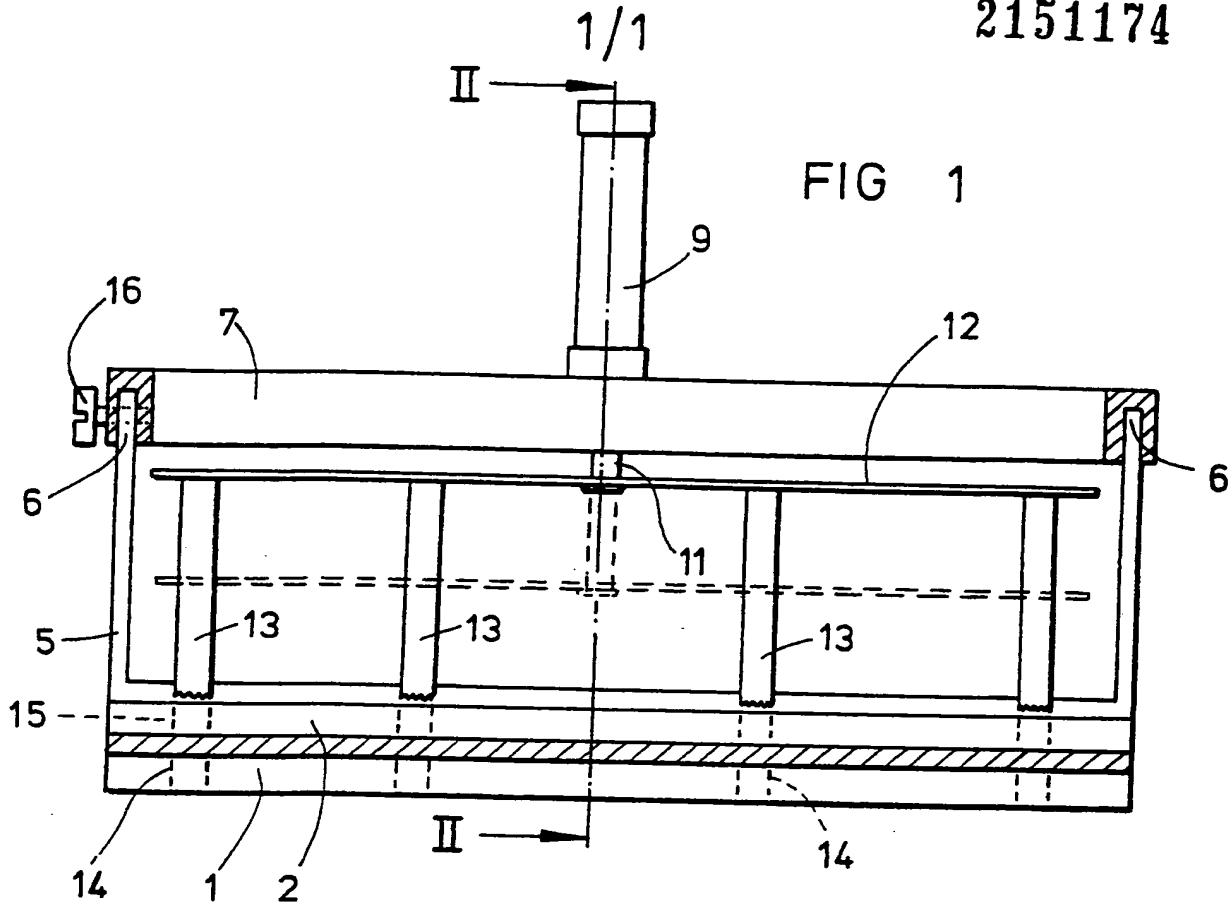
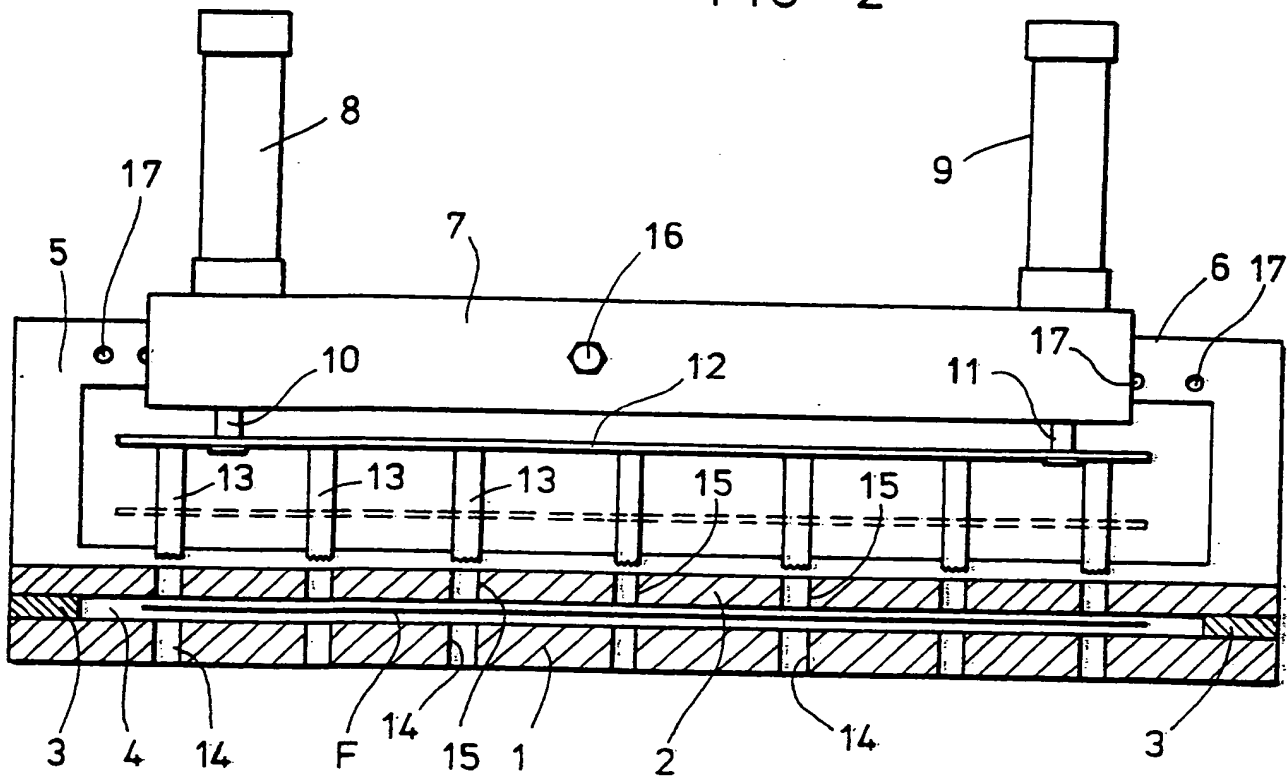


FIG 2



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## SPECIFICATION

## Machine for perforating plastics film

This invention relates to a machine for perforating plastics film, and in particular for punching multiple perforations in a plastics film such as polyethylene sheet commonly used in the manufacture of bags for fresh farm produce.

In conventional machines for the punching of holes in plastics film in, for example, bag-making machines, the holes are made by punches operated individually by respective pneumatic actuators. In order to form, for example, twelve holes in the walls of a plastics bag it would be necessary to employ twelve cutters or punches operated by means of twelve respective pneumatic actuators. Machines for the mass production of plastics bags have been proposed in which rows of perforations are punched in each bag as it travels through a machine, each row of perforations being punched by a row of punch tools or cutters carried by a movable bar. The bar may be operated by means of two pneumatic actuators arranged at or near opposite ends of the bar, but with such an arrangement it is possible only to form a linear row of holes.

An object of the present invention is to provide a machine capable of effecting multiple perforations, in a predetermined two-dimensional array, in a plastics film, for example in the production of plastics bags.

According to the invention there is provided a machine for perforating a plastics film comprising a die plate and a stripper plate arranged parallel to each other and spaced apart by a gap in which the film to be perforated is located, a punch carrier plate arranged parallel to the stripper plate on the side thereof opposite the die plate, a two-dimensional array of punch elements attached to the carrier plate and projecting towards the stripper plate, and fluid pressure actuator means connected to the carrier plate to move the latter perpendicular to its plane, the stripper plate and the die plate having respective apertures through which the punch elements pass in operation of the machine to punch a number of perforations simultaneously in a web of plastics film located in the said gap, in a pattern predetermined by the array of punch elements.

By providing the punch carrier plate with a two-dimensional array of holes at regular spacings, in which punch elements may be located and fixed selectively, it is possible to predetermine the pattern of perforations to be punched in a plastics film in operation of the machine. The machine is therefore readily adaptable to the perforating of plastics film in a variety of different two-dimensional patterns, and improves considerably the cost-effectiveness of a mass-production operation for making plastics bags with multiple perforations.

In a preferred embodiment of the invention the actuator means comprise two pneumatic actuators acting upon the carrier plate adjacent opposite edges thereof. The two pneumatic actuators may be carried by a support which is adjustable in position parallel to the stripper and die plates, means being provided for releasably clamping the support at any

selected position relative to the stripper and die plates.

Since the multiple perforations are formed in the plastics film by the operation of only two pneumatic actuators the operational cost of the machine, in terms of the compressed air expended, is considerably less than that of a comparable machine having a multiplicity of punch actuators.

The invention will be further described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a diagrammatic side elevational view of a perforating machine according to one embodiment of the invention, and

Figure 2 is a diagrammatic transverse cross section on the line II-II in Figure 1.

The illustrated machine is designed to punch multiple perforations in a plastics film, for example a double layer of polythene sheet from which plastics produce bags are to be made.

The machine has a fixed horizontal steel die plate 1, typically 10 mm thick, and a fixed steel stripper plate 2, also 10 mm thick, arranged parallel to the die plate 1. The stripper plate 2 is spaced from the die plate 1 by spacer strips 3 along opposite longitudinal edges (Figure 2) so that a gap 4 is defined between the two plates 1, 2 through which a film F to be perforated is passed in operation of the machine. Although shown as a single thickness in Figure 2, the film F may be a double thickness of plastics sheet in some bag-making operations.

A static frame 5 is supported above the parallel plates 1, 2 and extends horizontally above the stripper plate 2. The static frame 5 includes two horizontal rails 6 extending transversely of the gap 4 through which the film F is fed. The guide rails 6 support a sliding frame 7 which is moveable horizontally, that is, parallel to the two plates 1, 2 and above the stripper plate 2. The sliding frame 7 supports two double acting pneumatic piston-cylinder actuators 8, 9 arranged vertically with their respective piston rods 10, 11 projecting downwardly through apertures in the sliding frame 7. The actuator piston rods 10, 11 are attached to and support a punch carrier plate 12 of 1/16 inch stainless steel plate arranged parallel to the plates 1, 2.

The carrier plate 12 is pre-drilled with a regular two-dimensional array of holes, typically spaced apart at 40 mm centres, in which respective punch elements 13 may be located and secured selectively, to form a two-dimensional array of punch elements projecting perpendicular to the carrier plate 12 towards the plates 1, 2. Each punch element 13 is in this example of the crown cutter type terminating in a serrated crown-shaped cutter edge.

The die plate 1 and stripper plate 2 are provided with respective arrays of aligned holes 14, 15 matching and aligned with the holes in the carrier plate 12, so that the punch elements 13 engage in and pass through respective aligned pairs of holes 14, 15 when the carrier plate 12 is displaced into a lowered position, shown in broken outline in Figures 1 and 2, upon extension of the two actuators 8, 9.

The actuators 8, 9 are controlled by a single solenoid-operated valve so that the actuators always operate in unison. Upon extension of the two actuators 8, 9 the piston rods 10, 11 descend towards the stripper plate 2 causing the punch elements 13 to pass in succession through the holes 15 and 14 of the stripper plate 2 and die plate 1 respectively, punching holes in the film F in the process. Following each extension the actuators 8, 9 make a return stroke which causes the carrier plate 12 to return to its initial position, shown in Figures 1 and 2, withdrawing the punch elements 13 through the holes 14, 15. During this process the perforated film F is stripped from the punch elements 13 by the stripper plate 2.

To assist in the setting-up of the machine to perforate a film F with a desired pattern of holes the punch carrier plate 12 may be displaced to a desired position relative to the plates 1, 2 by adjusting movement of the sliding frame 7 relative to the static frame 5. When the desired position of adjustment of the sliding frame 7 has been reached the frame 7 is locked relative to the static frame 5 and, therefore, relative to the fixed plates 1, 2 by a locking screw or bolt 16 passing through the sliding frame 7 and engaging in a selected one of a number of locating holes 17 spaced apart at intervals along one of the guide rails 6, these intervals corresponding to the intervals between the holes 14, 15 in the plates 1, 2, and the corresponding punch location holes in the carrier plate 12.

#### CLAIMS:

1. A machine for perforating a plastics film,

comprising a die plate and a stripper plate arranged parallel to each other and spaced apart by a gap in which the film to be perforated is located, a punch carrier plate arranged parallel to the stripper plate on the side thereof opposite the die plate, a two-dimensional array of punch elements attached to the carrier plate and projecting towards the stripper plate, and fluid pressure actuator means connected to the carrier plate to move the latter perpendicular to its plane, the stripper plate and the die plate having respective apertures through which the punch elements pass in operation of the machine to punch a number of perforations simultaneously in a web of plastics film located in the said gap, in a pattern predetermined by the array of punch elements.

2. A machine according to Claim 1, in which the carrier plate is formed with a two-dimensional array of holes at regular spacings, in which punch elements may be located and fixed selectively to predetermine the pattern of perforations to be punched in operation of the machine.

3. A machine according to Claim 1 or Claim 2, in which the actuator means comprise two pneumatic actuators acting upon the carrier plate adjacent opposite edges thereof.

4. A machine according to Claim 3, in which the two pneumatic actuators are carried by a support which is adjustable in position parallel to the stripper and die plates, means being provided for releasably clamping the support at any selected position relative to the stripper and die plates.

5. A machine for perforating a plastics film, substantially as herein described with reference to and as shown in the accompanying drawings.